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# Influence of affluence on sustainable housing in Mysore, India

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**Mysore, the second largest city in the state of Karnataka, India, can be identified as an early adopter of sustainable design practices. Between 1903 and 1947 the use of local construction materials, the Swadeshi movement of 1905, robust planning and clear legislation resulted in sustainable urban development. However, post-colonial development fuelled by economic globalisation after the 1980s has transformed perceptions of the house among the growing middle class, becoming a commodity to demonstrate affluence and status. This paper examines the impact of changing social and cultural values on the aspirations of the growing middle classes on sustainable housing and neighbourhood development in Mysore. The methodology comprises literature and archive research to establish the historical content and review some important recent trends. Extensive fieldwork studies, including questionnaires over a wide range of participants (owners, builders and designers) and semi-structured interviews with key players, including academics, architects and government agencies. The focus of development has shifted from community to individual, from energy conserving to a more consumerist attitude in the procurement of materials and finishes. The paper examines the impact of these changes. The results of the survey are summarised and reviewed under the categories of communities, site, entrance, house layout and materials.**

## Glossary

*Agrahara* layouts: *Agrahara* (small Brahmin villages) that was prevalent 150–200 years ago was used as one of the prototypes for residential layouts adopted during the development plan prepared in 1904. They are row houses built around a park in a U-shape. The central park area was used for community socialising and as a children's play area. Each two-room house with a shared party wall had a small veranda and back yard. *Athithi devo bhava*: This is the verse in the '*Taittiriya upanishad' that says 'Matru devo bhava, pitru devo bhava, acharya devo bhava, atithi devo bhava*,' which means one should worship mother, father, teacher and guests as God. *Jagali: Jagali* is a semi-open raised space, which acts as a transition from the road to the inner part of the house. These places are always in the shade, it is a perfect space for socialising and acted as a meeting area for the inhabitants. They were actively used as interaction areas. People shared their leisure activities and entertainment with their neighbours in these informal spaces. *Swadeshi* movement: *Swadeshi* means 'indigenously manufactured'; it was the first of the four formally organised movements by Congress nationalists against the British Raj in 1905.

## 1. Introduction

Sustainable strategies followed in post-independence India have been described as either 'eco-technical' or 'eco-cultural' (Guy and Farmer, 2001). These technically complex or primitive approaches to a low carbon building do not address the social and cultural issues that underpin sustainable built environments. It is important to understand housing as a social

and cultural phenomenon that can allow insights into the effective formulation of localised and relevant low sustainable housing strategies.

The complex and multifaceted society of India is interwoven with caste, religion and regional disparities, in which new-found economic status and affluence in the middle class have a critical impact in the process of sustainable development. Rapid economic development has enabled the middle class to obtain greater dominance in the power structure of society (Singh, 2009). This research looks into the implications for sustainable building design for a newly affluent middle class, which has the financial strength to consume finite resources at a rate that starts to match that of the developed world.

The initial development of post-independence India was dominated by Mahatma Gandhi and the first Prime Minister, Nehru. In an immediate post-colonial context, the Indian middle class had historically followed Gandhian principles and restrained themselves from the obvious display of wealth (van Wessel, 2004). To give coherence to a country of diverse ethnic and cultural groupings, a national government prioritised the promotion of shared national value. Pre-eminent in this was a value attached to the notion of community over the needs and desires of the individual.

Continuing economic empowerment has drastically changed such uniformity and, as established by commentators like Leela Fernandes and Pavan Varma, economic development has in turn changed the social and cultural values of Indian middle class people. It has transformed the cautious mentality of the thrifty middle class to one of affordable indulgence (Varma, 2007). According to Andre Beteille, although the aspirations of the new middle class Indian typically centre around career (Imtiaz and Helmut, 2001), it is consumerism that has clearly become the primary Indian value (Fernandes, 2000b). The media exploited the middle class to create a new consumer culture. They did this effectively by targeting the materialist middle class. While some segments of a culturally sensitive Indian middle class still assign value to active citizenship (Khilnani, 2004; Varma, 2007), confident expressions of upward social and economic mobility are demonstrated in the desire and aspiration to construct their own homes.

At present, India is the second fastest growing economy of the world with an average annual growth rate (gross domestic product) expected to be 7–7·5%, increasing the affluence of approximately 350 million middle class people. Their consumption is evident in the construction sector, which has a growth rate of 15% (Swarup, 2007). Although increased affluence and consumption benefits middle class people, it has also increased carbon emissions. Sixty per cent of the emissions originating from construction activities are be attributed to the housing sector (Tiwari, 2003).

The increase in house building activity that comes with growing prosperity and a propensity towards ostentation has a deep impact on the built environment in respect of both embodied and operating resource impacts. The impact can be mitigated by deploying intelligent design solutions that work in concert with middle class values and aspirations. In the first step to establish sustainable design methodologies, a fieldwork study was undertaken in the southern city of Mysore (Figure 1). The purpose of this research is to ascertain the key factors that govern the design of middle class housing and what indications this might give to the establishment of robust methodologies for the design of sustainable homes.

Mysore city was the capital of the former south Indian kingdom of Mysore, and is situated approximately 140 km south-west of Bengaluru (Bangalore). In 1904, the monarch, Krishnaraja Wadiyar, proposed the first development plan for Mysore to improve health and hygiene and decongest the central fort area that was the centre of political power. In the process he had established a reputation for sound, sometimes


**Figure 1.** India map: Mysore location

technocratic government that consciously encouraged climate responsive and low impact urban planning solutions. This has been recognised as a useful forerunner for contemporary strategies for sustainable architecture in Mysore (Satish and Brennan, 2010; Vandana, 2008). It is now an important city in the state of Karnataka, and is recognised as having a significant cultural status. Although Mysore has had sustained growth from tourism and industry, the more recent growth of IT industries in the 2000s has resulted in the city becoming an important hub after Bangalore. Overspill from Bangalore and its growth rate has resulted in a city of 124·82 $km^2$ in area, with an urban population of 780 000 people (see Mysore City Corporation, 2010). Development pressures after independence and economic liberalisation have drastically changed neighbourhood patterns and housing typologies. This study traces how economic empowerment has changed social and cultural values and created significant implications for sustainable development in Mysore.

The fieldwork undertaken for this research explores the attitudes of building users, designers, business and government towards the current housing provision in Mysore. This is framed in a series of changes in scale, from that of the neighbourhood to the selection of finishes in a home. Each of the study sections is explored within the context of past and present characteristics of housing within Mysore. The fieldwork was carried out by the first author during June 2009 and August 2009. This paper presents a summary of some of the key findings.

## 2. Methodology

A review of the literature was used to establish traditional, sustainable practice and identify important current trends. Towards the end of the twentieth century a more Western lifestyle has evolved in India. The review also indicates a change in people's attitudes and aspirations that has a direct bearing on sustainable housing. In order to understand these changes in depth, a field survey of house owners was conducted in Mysore. The fieldwork examines builders' and architects' attitudes to design and procurement along with contemporary practice. The paper draws particular inferences related to communities, layout, house design and materials from the questionnaires and interviews.

In order to understand the composition, practices, trends and attitudes of the middle class, the research engages with a wide field of built environments and social contexts, and as such requires methodologies that allow rigorous but flexible interpretation of fieldwork. Verification is sought using triangulation methodologies (Bryman, 2008; Groat and Wang, 2002) that can allow the usefulness of data to be reviewed from a variety of different sources. In this case, research has been conducted through literature review, scoping questionnaires and structured interviews. A key aspect of the methodology is, therefore, to assess each aspect of the research critically in relation to themselves (Figure 2).

The review has been employed specifically to study and chart the rapid transformation and enlargement of the Indian middle class. The utilisation of building products and technologies is, in this context, driven as much by cultural aspiration as performance and price. This literature review then underpins the structure of the fieldwork, interviews and questionnaires.

In undertaking the survey work, attitudinal differences between occupation and social profile are identified through the use of common questions. Survey questionnaires were collected from 220 persons, who included the majority of practising architects and builders along with owners in Mysore. While distributing the questionnaires among owner-occupiers, special care was taken to ensure that different settlement patterns were represented. This included the old quarter of Mysore around the fort and palace that featured *Agrahara* layouts, those living in post-independence planning schemes and those in recent private sector developments. A wide spectrum of respondent occupations was collected, including government employees, state agencies in addition to more recent additions such as software and IT sectors (Figure 3).

In addition to this, a series of structured interviews was undertaken with key personnel involved in the built environment (Figure 4). Seventy interviews were conducted including architects, developers, local government, academic representatives, and owner-occupiers. The structured interviews dealt with similar issues as those found in the questionnaires but allowed in-depth discussion, facilitating a nuanced series of responses to contextualise the questionnaire data.

Triangulation of the research is thus through the complementary use of literature review, questionnaire and structured interview. Within the context of fieldwork, this triangulation methodology is further used through collecting responses of those lying within client/consumer, development and regulatory fields.

In order to analyse the impact of development on neighbourhoods and housing, collected data are examined for key indicators of sustainability from the macro to the micro scale that comprise community living, site layout, entrance, house planning, finishes and facade.

## 3. Community living

Commentators such as Leela Fernandes and Verma have argued that economic empowerment supplemented by exposure to media has transformed culturally rooted people to explore redefined values, which have major impacts on an

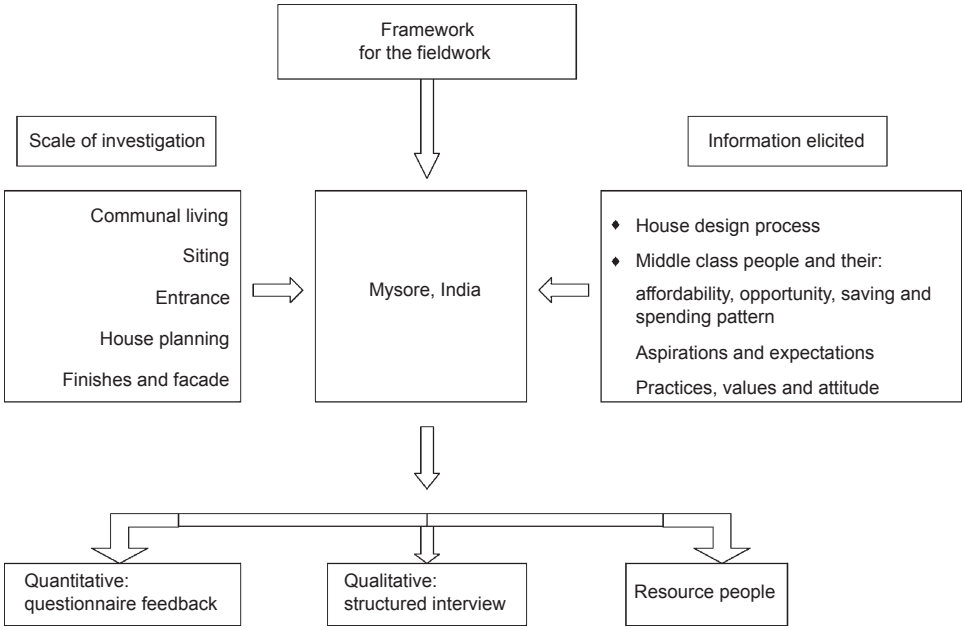


**Figure 2.** Framework for the fieldwork – overview of the fieldwork undertaken at Mysore, India

otherwise sustainable lifestyle (Fernandes, 2006). In the case of Mysore, these values along with occupation have a bearing on the typology of housing.

Earlier housing patterns were developed in response to the strong 'joint family system' (in the Indian subcontinent, joint family is an extended family where many generations live under

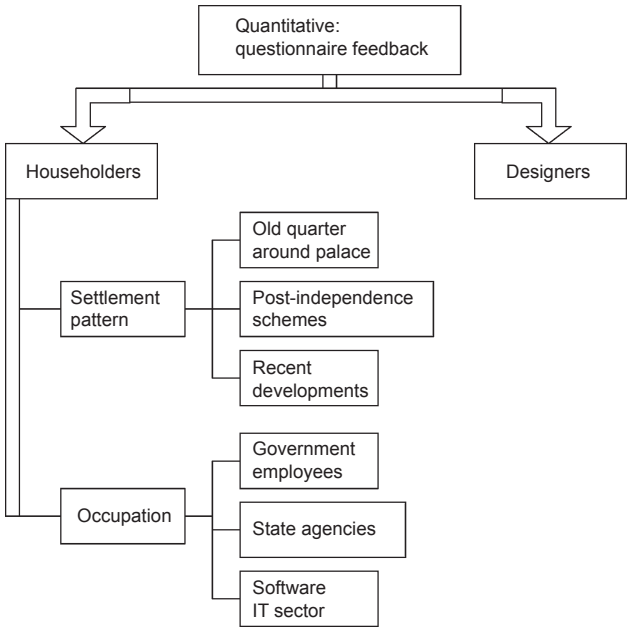


**Figure 3.** Quantitative study structure followed during the fieldwork undertaken at Mysore, India

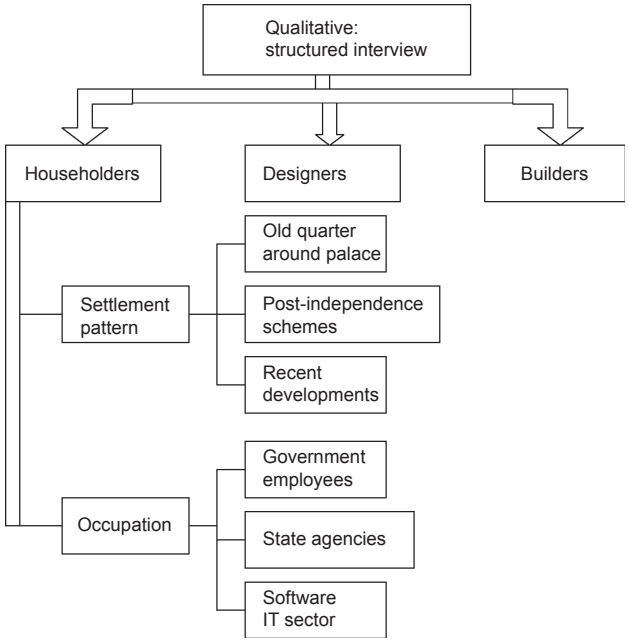


**Figure 4.** Qualitative study structure followed during the fieldwork undertaken at Mysore, India

the same roof. Usually the male members are blood relatives). Shared spaces were given most importance due to their use for community socialising and dining. This resulted in spacious multipurpose central areas used for the most part of the day and a number of smaller rooms used mostly for storage. The data collected at Mysore clearly show a movement away from the joint family system. As people move away from family-based occupation, sharing of common spaces diminishes or becomes obsolete, and families move towards owning individual houses. Feedback from the questionnaires indicates that less than 5% of respondents live in a joint family household. This has resulted in the most commonly used spaces in traditional shared family compounds being no longer relevant, while private spaces become more important. According to many of the architects interviewed, clients prefer separate rooms based around particular activities like the computer or television.

A key dimension of social interaction of an Indian family is the guest. Traditionally, a guest was treated equal to God (*athithi devo bhava*). While understanding the transformation of house design, the role of a guest and neighbours is examined in today's context to understand changing cultural and social values. According to one respondent, a guest is equal to a family member, and they treat guests equal to their family even today. Another respondent felt strongly that hospitality and respect depended on the social or economic status of the guest. This change in attitude towards guests and neighbours has clearly reflected in their redefined housing typology (CITB, 1987). For instance, the traditional '*jagali*', a semi-open raised space that acts as a transition from the road to the inner part of the house, overlooking the community area, was a welcoming space for guests and neighbours as the layout was developed based on their socio-cultural background. Work-related mobility has increased substantially among skilled and unskilled workers with different socio-cultural backgrounds. This has resulted in redefined requirements. Community areas are replaced by an introverted house design, in which fencing each plot for one's identity has become more of a physical barrier for neighbours and guests.

The change in community living and social values has a major impact on sustainable housing. Independent houses rather than clustered housing have increased the footprint of dwellings by 50% (Satish and Brennan, 2010), which has clear implications on the proportional increase in resource consumption and embodied energy. The use of individual spaces over shared spaces increased the consumption of operational energy of a household and, consequently, the carbon footprint.

Changing family patterns along with a change in work pattern also contribute to an increased carbon footprint. The nuclear family compared with a joint family occupies more space per person and further increases energy consumption.

## 4. Siting

The city of Mysore originally grew from considered, planned development even during the colonial period. The coming together of *Swadeshi* narratives of self-help (and self-determination) ensured a preference for localised material sourcing and responsive planning configurations (Vandana, 2008). Post-independence (1947), social change encouraged by the state development authority has promoted middle income demographics to favour discrete plotted developments in the Western model.

*Agraharas* were used as a prototype for the new residential layouts during the preparation of the development plan in 1904 (Issar, 1991). Typically, residences were distributed around an open space or aligned linearly with a shared party wall (terraced) built to the edge of the road. People shared their leisure activities and entertainment with their neighbours in these informal spaces (Figure 5). This inherently environmentally responsive form derived from the social classification based on occupation had clear advantages of shared security and social interaction.

Planning, housing and built environment practices changed drastically after independence. There was a clear shift from a homogenous to a heterogeneous society and from joint to nuclear family, resulting in people being attracted towards

Figure 5. A typical *agrahara*, where one enters the semi-opened raised area from inside, which is open to the road, which further leads to the community open space (compound to community area is later addition)

plotted development. As one town planner recollects, 'European modelled, plotted development, started as part of town and country planning in Bombay (Mumbai), Madras (Chennai), Delhi and Calcutta (Kolkata). Later, development authorities implemented them in other cities' (respondent no. 1, interviewed on 17 June 2009). As an executive engineer responsible for urban housing development recollects, in the initial stages of the City Improvement Trust Board (CITB), the government allotted some sites free of cost for those who bought houses from the CITB, away from the city centre. According to a respondent, during the 1980s, the CITB sold 15 m $\times$ 24 m plots with a house of 126 $m^2$ area for Rs. 40000 (£514·30). A plot in the same area currently costs nearly 10 million rupees (£128 585) (respondent no. 38, interviewed on 14 July 2009).

Altered social and cultural values have played a crucial role in the adoption of new housing typologies. Changed social conditions meant that people started to associate the strengths of community living as weaknesses. For instance, shared facilities were interpreted as leading to a lack of privacy. Interview response suggests that the occupiers identify issues such as sanitation, ventilation and maintenance as key reasons for moving away from cluster and row housing to plotted developments. More than 70% of the householders indicated that they would experience good conditions of light and ventilation only by living in a detached house.

A shift in perception is reflected in the feedback, in which respondents attach the highest priority to building location, which mostly relates to land cost, and least importance to interaction with and proximity to neighbours, family and friends. Homogenous interactive spaces are thus replaced by individual plots, which are further emphasised by gated compounds that have become necessary to establish territory and status (Figure 6).

When asked about revisiting vernacular and traditional modes of shared space, the study indicated that building designers and procurers felt it a challenge to work against consumer preference. One householder remarked, 'we cannot have party wall because of compatibility between neighbours. One could be emotionally closer but has to be physically separate. It has to be a single entity. A group house does not sound like a whole house' (respondent no. 33, interviewed on 11 July 2009). Current housing typology at Mysore has therefore moved away from community planning and inherent sustainable practices. These were organisational approaches and strategies that were sustainable, which have now been overtaken by increased affluence.

Community living, which encouraged shared facilities and the use of locally sourced materials, resulted in low energy consumption for transportation. Environmentally responsive design resulted in comfortable interior spaces that required very low operational energy.

Additional construction for independent houses and individual security to protect the property in the form of a compound has further increased the consumption of building materials. In spite of higher land values, being away from the city and workplace, middle class people are spending more money to

Figure 6. New layout. Reflects typical plotted development away from road, built with clear open spaces on all sides, independent of each other

own a plot increasing the dwelling footprint. The social value attached to the individual house has a high environmental cost.

## 5. Entrance

Entrances have always been more than just a threshold to the interior of homes. In the past, people used the semi-open raised spaces forming the entrance as a climate modifier, which then naturally became a place of social and community interaction throughout the day. This smooth transition space from the street to the interior of a home is very different in contemporary developments. The changes to this transition space are considered in the following section.

The *jagali* acts as a fluid transition between interior and exterior spaces (Figure 7). People shared their leisure activities and entertainment with their neighbours in these informal spaces (Satish and Brennan, 2010).

In contemporary developments, houses are set back from the boundaries, with no clearly defined use for the outdoor ground (Figure 8). The building form no longer encloses and defines the external space that encouraged outdoor activities. Privacy is given priority over community. The large windows of the contemporary housing designs do not overlook and engage with the community, instead each building is self-contained and introspective (see MUDA, 2005). Roads, independent of houses, consist of pedestrian ways and are clearly segregated from the protected private property, and are supported by spatial planning (MUDA, 1996). Although in a purely functional sense, these layouts are well worked out, it is a clear departure from the relative social sophistication in the operation of the courtyard and *jagali* forms.

**Figure 7.** *Jagali* transition. This transition space was and is used for the most part of the day for different activities. This climate-responsive space would have been in the shade for most of the day

**Figure 8.** New houses: compound before main door. This image of the new layout clearly shows the barrier between the road and entrance. A further lack of communication between the house and the road is evident

Density and mode of transport also affects the *jagalis*. Increases in the flow of traffic, both vehicular and pedestrian, from outside the neighbourhood has led to increased noise and pollution, making the *jagali* more difficult to use in its traditional way.

One architect stated, '…now application of the *Jagali* is restricted to the farmhouse. It was effective when the known people use to overlook the community spaces. Now the fabric has changed, and hence it is obsolete' (respondent no. 29, interviewed on 10 July 2009). The climatically driven, inviting *jagali*, which acted as a series of bioclimatic transitions from outside to inside the house is now replaced by a clear demarcation between roadway and plot. Almost all the respondents viewed compounds as more of a psychological security, offering protection of the property and defining territory. According to practising architects 'compounds are also used as a tool to express their client's prestige symbolically' (respondent no. 18, interviewed on 30 June 2009). When asked about the need for physical demarcation, one respondent said 'For privacy and cordial relation, earlier people wanted one other; nowadays people do not need others. We do not want to have the problem during children time (in future), so a compound is built' (respondent no. 36, interviewed on 14 July 2009). Citing this concern for the shift away from climate-responsive spaces, 70% of the architects interviewed suggested that they follow this trend and do not see themselves playing a role in promoting sustainable attitudes with clients. One architect summed it up as, 'we cannot complain, we have to go with the trend, it is the question of how well we can adjust to the new situation' (respondent no. 17, interviewed on 30 June

2009). One respondent strongly expressed the view that 'the emphasis on compound as a barrier is to ensure their children do not mingle with other children from different social backgrounds' (respondent no. 20, interviewed on 1 July 2009).

The earlier interactive, participative open spaces have thus now become individual and self-centred, supported by planning regulations that divide land into roads and individual plots (MUDA, 1996). Although the concept of open space has regained importance, it is no longer public. According to a builder 'importance is given for external spaces. Sometimes it is used as part of the internal space. Mostly it is a private space' (respondent no. 51, interviewed on 16 July 2009). With the redefined lifestyle, the time spent in these open spaces is subjective. The interview feedback of respondents in terms of their daily routine clearly suggests that individuals and families spend the least amount of time in these open spaces.

Mysore enjoys a mild and pleasant climate, and people are able to spend more than 50% of their time in climate-responsive *jagalis*. A daily routine based around daylight and climate has resulted in low energy use. The consumption of embodied energy to facilitate indoor activities has also increased the operational energy. Furthermore, in newer developments, the effective use of open space has drastically changed to gated private spaces, which reflect the specific concerns and aspirations of emerging householders.

## 6. House planning

In the past, spatial configuration and construction materials used in domestic buildings were sourced locally and had low energy impacts. There are implications for materials in the shift from multifunctional spaces to specific rooms for discrete activities. The selection of building materials and assemblies is examined in this section. Their use is governed by the projection of the status of the occupier as well as satisfying functional requirements.

Traditional housing in Mysore, before independence, was constructed of thick mud walls and terracotta tile roofs. The houses had small openings towards shaded areas (Figure 9). By 1987, this was completely replaced by the brick wall with cement plaster and reinforced concrete roof (CITB, 1987). Spatially, the relatively large central hall was used as an internal meeting area. Very few spaces inside the house had a fixed purpose (Ikegame, 2007). Most spaces were multifunctional and their use was determined by the occasion; for example, the central hall was used for socialising, working, sleeping and dining (Figure 10).

Housing design changed to a partitioned space with clearly defined functions (CITB, 1987). Influenced by the Western model, importance is given to larger openings and privacy

**Figure 9.** External space. This view of the *jagali* clearly shows the way the house engages with the surroundings. This part was and is used for most of the day. It also reflects the use of locally available material and culture

while defining spaces. All respondents expressed their concern for good light, ventilation and privacy as crucial aspects along with affordability as a priority during the design process. It is this declared desire for light, ventilation and privacy that encourages householders to move away from cluster development to individually plotted schemes.

While analysing the adoption of these housing typologies in Mysore, most architects and builders believe that the European

**Figure 10.** Old interior. This view shows the multipurpose area with locally available material. It reflects the maximum use of daylight and the least furniture resulting in very low operational costs

model of building organisation reflects their client's aspirations. More than 60% of the respondents feel their house reflects their social background and character, while 10% of the respondents believe it is their status and wealth that is reflected in their house. Fieldwork clearly indicates that more than 95% of these respondents interviewed reside in houses built according to a European model. This reflects the redefined requirements and expectations of the households.

At the national level, economic liberalisation provided an opportunity for individuals to aspire to wealth across the class structure. The middle classes are the biggest beneficiaries of this phenomenon. According to Satish Deshpande, the middle classes have consolidated their social, economic and political standing through globalisation (Deshpande, 2004). Economic liberalisation not only encouraged upward mobility for the middle classes, it also supported the notion of progress for the lower classes to aspire to economic development (Fernandes, 2000a).

The resultant impact on housing is evident in Mysore. According to one practising architect, the average age of a commissioning client is much younger than the previous generation. This has a greater impact on design, as clients are more open to new ideas, design, materials and technology. Concern for the change in attitude is evident as quoted by a builder 'the concept of the house as a 100-year asset is changing, and people are planning for only 15 to 20 years. Though this is good for industry, it has to be examined from the sustainability point' (respondent no. 54, interviewed on 18 July 2009). In this context, clients' attitudes can be summed up as one architect puts it, 'now people are trapped by the outlook of the building, they do not understand the relation of comfort to design and material usage. Their desire is beyond basic requirements, frequently it is to show off. Some client's expectation of traditional architecture is superficially met' (respondent no. 6, interviewed on 26 July 2009). The significance of the shift in planning is evident, when a builder interviewed says 'over a period of time there has been a clear shift from homes designed for minimal living space to viewing the buildings as a commodity to show one's wealth' (respondent no. 43, interviewed on 14 July 2009).

Economic liberalisation and increases in personal wealth have stimulated middle class segments to import materials and redefine their personal spaces. An aspiration to demonstrate wealth has resulted in the use of environmentally insensitive materials with high embodied energy. Two representative instances of this are the use of marble transported from quarries 2000 km from the city, and large glazed areas with imported timber frames. Furthermore, the house being more compartmentalised and used for demonstration, there is an evident increase in the size of individual houses and more materials are used for internal walls. This has clearly resulted in increased embodied energy and operational energy. Users see their house having a short useful life compared with the inherent flexibility of older buildings this has a direct bearing on the lifecycle energy consumed by contemporary houses.

## 7. Finishes and facade

The earning power of the emerging Indian middle class is much greater than that of their parents and often expresses itself in home construction and interiors (Figure 11) (Saavala, 2003). In tracing the use of household items that people use to associate their needs and status, there is a clear increase in the use of energy-intensive items. The survey studied the items considered important by the middle class occupier. There are major increases in most goods such as washing machines, ovens, air conditioning, cars and foreign travel compared with 15 years previously with the exception of television and the telephone (Figure 12). According to a respondent 'aspirations have forced the middle classes to spend more on finishes and burden themselves unnecessarily' (respondent no. 33, interviewed on 11 July 2009). Most of the time, this act is more for demonstration than real need.

More than 70% of the respondents seek to invest additional money on better quality materials. According to the feedback from the practising architects at Mysore, more than 65% of their clients are aiming for the most expensive, imported and best materials, which will reflect their status during the selection process of finishing materials for flooring, elevation, electrical fixtures, plumbing fixtures and woodwork (Figure 13). This contrasts with the traditional Mysore, which encouraged local crafts and promoted locally sourced materials as part of their early development strategy (Vandana, 2008).


**Figure 11.** New interior. This modern house interior with quality flooring, large window and furniture reflects the aspirations of middle class people

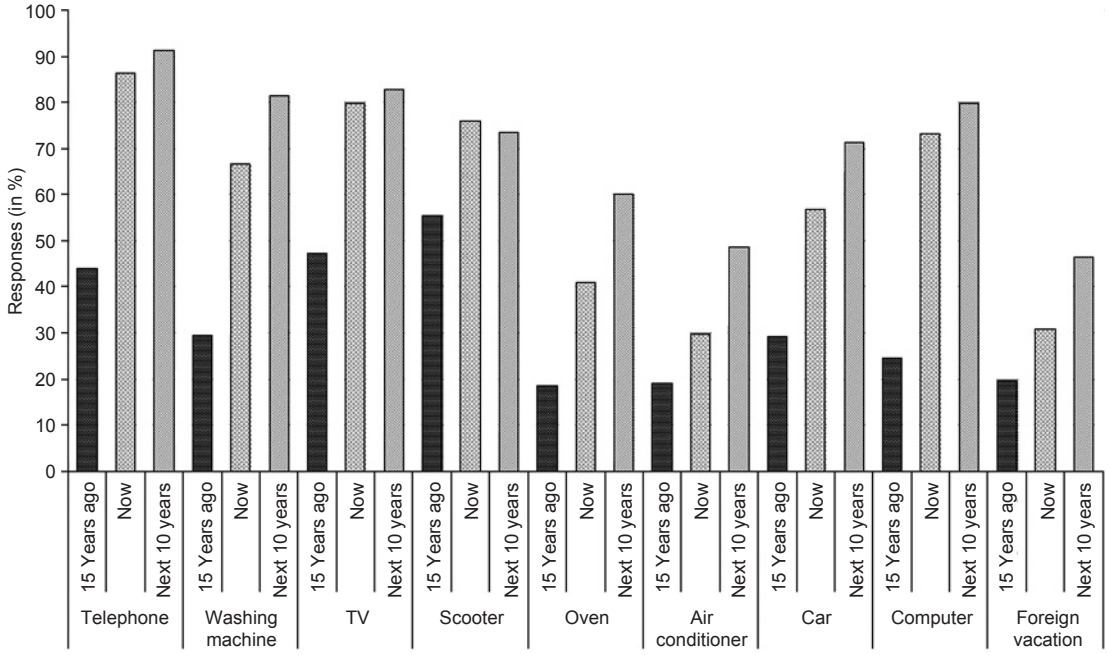


**Figure 12.** Significance of items and its influence. This feedback from respondents clearly demonstrates the increase in almost all the energy-resourced aspects, which are aspired to by middle class people; further respondents tend to use lots more in the days to come

Although more than 60% of the respondents assert that they want simple, utilitarian housing, they contradict themselves by the care shown in external finish and the quality of materials used in the interiors (Figure 11). For instance, many houses have marble flooring or granite cladding tiles for the front side of the house, which in both cases do not reflect the utilitarian value of the materials. According to an interviewed scientist from 'the Energy Research Centre' (TERI), 'middle class people, not being satisfied with what they have, they are striving hard to achieve luxury' (respondent no. 69, interviewed on 11 August 2009).

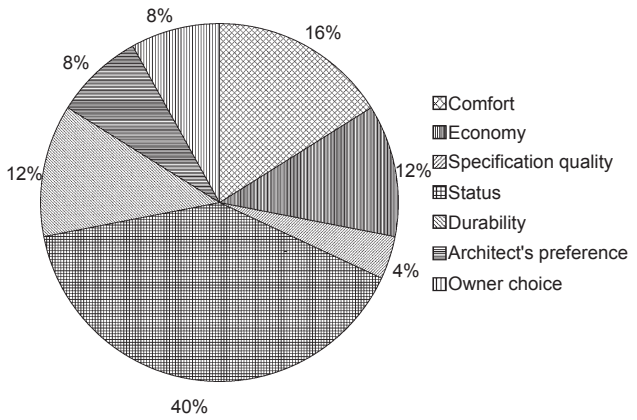


**Figure 13.** Material selection. Architects in their feedback have identified their clients' choice of materials would firstly reflect their status and was followed by comfort

Furthermore, there is a clear difference between the traditional 'Gandhian' middle class people and recent, more materialist additions. An architect remarks, 'traditional middle class people would prefer bigger spaces (Figure 14) when compared to the people who have climbed the ladder of economic success. This so-called ''newly arrived'' middle class prefers high quality finishes announcing their arrival' (respondent no. 32, interviewed on 11 July 2009). As one respondent sums it up, 'exhibitionism is the important characteristic of middle class people…. Hypocrisy is evident while they keep Geeta, Gandhi and other great books in the showcase, where none of these were read' (respondent no. 34, interviewed on 12 July 2009).

The impact of a recent desire to project affluence is evident in the selection process of materials and finishes. Most of the materials and finishes are either imported or processed with

Figure 14. Internal space. A typical interior of the central court, around which most of the activities take place. This image also reflects the local materials used for flooring, columns and roof

high energy, resulting in the consumption of higher embodied energy. For instance, Italian marble for flooring, Australian sal wood for door and window frames use very high energy for transportation; ceramic and vitrified tiles used for cladding use high energy in the manufacturing process, increasing the embodied energy of the materials. Effectively, all these factors demand high energy and due to house design and lifestyle drastically cause once sustainable housing to drift towards an unsustainable built environment.

Traditional built forms did not require mechanical ventilation. Changing the built form necessitates mechanical ventilation; typically, fans consuming approximately 80 W energy for a dwelling area of 108 $m^2$, whereas the aspiration to use air-conditioning demands 1000 W of energy for the same area (Lall and Ruchi, 2008). The survey demonstrates middle class people's inclination to use these items more extensively in the future, which may require an excessive need for operational energy. The consequences of increased operational energy is the result of both changing geometry resulting in new building typology and lifestyle changes resulting in the extensive use of internal space.

## 8. Conclusion

The study in this paper, using a literature review and survey fieldwork, has highlighted the relatively recent shift in attitudes and cultural values related to housing, from an inherently sustainable approach that valued shared spaces, local materials and communal activities to one that reflects a direction pointing more towards a twentieth century Western approach of individual, nuclear family, consumer-driven values.

The particular points are as follows:

- There is a clear move from multipurpose shared spaces and community spaces to individual entities, which has resulted in higher energy required for transportation, embodied energy and operational energy.
- A new housing typology has been implemented without reflecting local climate that has led to the increased consumption of operational energy. Emphasis on privacy has resulted in the use of further resources to protect property.
- Reformed social and cultural needs have resulted in climate-responsive spaces such as *jagalis* becoming redundant, and thus have increased the embodied energy and operational energy required to build and use internal spaces.
- Improved financial resources coupled with changing aspirations have contributed to building bigger houses, again increasing the consumption of embodied energy and operational energy.
- The shift towards expensive, imported and best materials for finishes to reflect their status has resulted in the consumption of high embodied energy. The increased use of electric utilities and air conditioners has resulted in the excessive use of operational energy.

The growing affluence of the Indian middle classes, reflecting the rapidly growing economy, has created a very large and powerful consumer group that is turning its back on traditional sustainable patterns of housing development and lifestyle in favour of the Western model. These changes inevitably result in both a major increase in the embodied energy and the operational energy of housing. Most architects currently see their role as meeting the aspirations of their clients.

The research has shown that there is an urgent need to balance the aspirations of this growing middle class with the broader needs of a sustainable lifestyle and community. There is clearly a revised role and agenda for architects to support and encourage sustainable development.

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